

Section 1605.3. State Standards for Non-Federally- Regulated Appliances.

(a) Refrigerators, Refrigerator-Freezers, and Freezers.



- (1) **Energy Efficiency Standard for Coolers.** The energy consumption of coolers manufactured before October 28, 2019 that are designed and sold for use by an individual shall be no greater than the applicable values shown in Table A-15

Table A-15
Standards for Coolers

| Appliance | Maximum Annual Energy Consumption (kWh) |
|---------------------------------|---|
| Coolers with manual defrost | 13.7V + 267 |
| Coolers with automatic defrost | 17.4V + 344 |
| V = volume in ft ³ . | |

- (2) **Energy Efficiency Standard for Water Dispensers.** The standby energy consumption of bottle-type water dispensers, and point of use water dispensers, dispensing both hot and cold water, manufactured on or after January 1, 2006, shall not exceed 1.2 kWh/day.

- (3) See section 1605.1(a) of this Article for energy efficiency standards and energy design standards for:

(A) consumer refrigeration products including

- miscellaneous refrigeration, including but not limited to coolers manufactured on or after October 28, 2019;

(B) commercial refrigerators, commercial freezers, commercial refrigerator-freezers including hybrid commercial refrigerator-freezers; automatic commercial ice makers; walk-in coolers and walk-in freezers; and refrigerated canned and bottled beverage vending machines

(b) Room Air Conditioners, Room Air-Conditioning Heat Pumps, Packaged Terminal Air Conditioners, and Packaged Terminal Heat Pumps.



See Section 1605.1(b) of this Article for energy efficiency standards for room air conditioners, room air conditioning heat pumps, packaged terminal air conditioners, and packaged terminal heat pumps that are federally-regulated consumer products or federally-regulated commercial and industrial equipment.

(c) Central Air Conditioners, Air Filters, and Heat Pump Water-Heating Packages.



- (1) **Energy Efficiency Standards for Ground Water-Source Heat Pumps and Ground- Source Closed-Loop Heat Pumps.** The EER and COP for ground water-source heat pumps and ground-source closed-loop heat pumps manufactured on or after October 29, 2003, shall be not less than the applicable values shown in Table C-10.

*Table C-10
Standards for Ground Water-Source and Ground-Source Heat Pumps*

| Appliance | Rating Condition | Minimum Standard |
|--|---------------------------------|------------------|
| Ground water-source heat pumps (cooling) | 59°F entering water temperature | 16.2 EER |
| Ground water-source heat pumps (heating) | 50°F entering water temperature | 3.6 COP |
| Ground-source heat pumps (cooling) | 77°F entering brine temperature | 13.4 EER |
| Ground-source heat pumps (heating) | 32°F entering brine temperature | 3.1 COP |

(2) **Energy Efficiency Standards for Computer Room Air Conditioners.** The EER of evaporatively-cooled computer room air conditioners manufactured on or after the effective dates shown, shall be not less than the applicable values shown in Table C-11.

(A) **Computer Room Air Conditioners.** See Section 1605.1(c) of this Article for energy efficiency standards for air-cooled computer room air conditioners, glycol-cooled computer room air conditioners, and water-cooled computer room air conditioners.

*Table C-11
Standards for Evaporatively Cooled Computer Room Air Conditioners Minimum EER (Btu/watt-hour)*

| Appliance | Cooling Capacity (Btu/hr) | Minimum EER (Btu/watt-hour) |
|--------------------------------|---------------------------|---|
| | | Evaporatively-Cooled Effective October 29, 2006 |
| Computer room air conditioners | < 65,000 | 11.1 |
| | ≥ 65,000 and < 135,000 | 10.5 |
| | ≥ 135,000 and < 240,000 | 10.0 |

(3) **Gas-fired Air Conditioners and Heat Pumps.** There is no energy efficiency standard or energy design standard for gas-fired air conditioners or gas-fired heat pumps.

(4) **Other Central Air Conditioners.** See Sections 1605.1(c) 1605.2(c) of this Article for energy efficiency standards for central air conditioners that are federally-regulated consumer products or federally-regulated commercial and industrial equipment.

(5) **Heat Pump Water-Chilling Packages.** There is no energy efficiency standard or energy design standard for heat pump water-chilling packages. The performance of each model shall be reported per the requirements of section 1606 of this Article for equipment manufactured on or after July 1, 2016.

(6) **Air Filters.** There is no energy efficiency standard or energy design standard for air filters.

(d) Portable Air Conditioners, Evaporative Coolers, Ceiling Fans, Ceiling Fan Light Kits, Whole House Fans, Residential Exhaust Fans, Dehumidifiers and Residential Furnace Fans



(1) **Energy Efficiency Standards for Portable Air Conditioners.** The combined energy efficiency ratio (CEER) of single-duct and dual-duct portable air conditioners manufactured on or after February 1, 2020, shall not be less than the value calculated in the following equation, where SACC is the seasonally adjusted cooling capacity of a portable air conditioner:

$$CEER = 1.04 \times SACC / (3.7117 \times SACC^{0.6384})$$

- (2) **Dehumidifiers and Residential Furnace Fans.** See Section 1605.1(d) of this Article for energy design standards for dehumidifiers and residential furnace fans.
- (3) **Ceiling Fans and Ceiling Fan Light Kits.** See Section 1605.1(d) of this Article for energy efficiency standards for ceiling fans and ceiling fan light kits.
- (4) There are no energy efficiency standards or energy design standards for spot air conditioners, evaporative coolers, whole house fans, or residential exhaust fans.

(e) Gas and Oil Space Heaters and Electric Residential Boilers.



(1) Boilers, Central Furnaces, and Duct Furnaces.

(A) The efficiency of boilers, central furnaces, and duct furnaces, shall be no less than, and the standby loss shall be not greater than, the applicable values shown in Tables E-7, E-8, and E-9.

*Table E-7
Standards for Boilers*

| Appliance | Output (Btu/hr) | Standards | | |
|---|-----------------|----------------|-----------------------------------|------------------------------|
| | | Minimum AFUE % | Minimum Combustion Efficiency % * | Maximum Standby Loss (watts) |
| Gas steam boilers with 3- phase electrical supply | < 300,000 | 75 | — | — |
| All other boilers with 3- phase electrical supply | < 300,000 | 80 | — | — |
| Natural gas, non-packaged boilers | ≥300,000 | — | 80 | 147 |
| LPG Non-packaged boilers | ≥300,000 | — | 80 | 352 |
| Oil, non-packaged boilers | ≥ 300,000 | — | 83 | — |

*At both maximum and minimum rated capacity, as provided and allowed by the controls.

*Table E-8
Standards for Furnaces*

| Appliance | Application | Minimum Efficiency % |
|---|-------------|---|
| Central furnaces with 3-phase electrical supply < 225,000 Btu/hour | Mobile Home | 75 AFUE |
| | All others | 78 AFUE or 80 Thermal Efficiency (at manufacturer's option) |

*Table E-9
Standards for Duct Furnaces*

| Appliance | Fuel | Standards | | |
|---------------|------------------|---|---------------------------|---|
| | | Minimum Thermal Efficiency % ¹ | | Maximum Energy Consumption during standby (watts) |
| | | At maximum rated capacity | At minimum rated capacity | |
| Duct furnaces | Natural gas | 80 | 75 | 10 |
| Duct furnaces | LPG ² | 80 | 75 | 147 |

¹ As provided and allowed by the controls.
² Designed expressly for use with LPG.

- (B) Natural gas-fired duct furnaces manufactured on or after January 1, 2006, shall have either power venting or an automatic flue damper.
- (C) See Section 1605.1(e) of this Article for design standards for:
- (1) Design standards for unit heaters manufactured on or after August 8, 2008;
 - (2) Efficiency standards for wall furnaces, floor furnaces, room heaters, gas-and oil-fired central furnaces and residential electric furnaces that are federally regulated consumer products; and
 - (3) efficiency standards and design standards for boilers that are federally regulated consumer products.
- (2) **Oil Wall Furnaces, Oil Floor Furnaces and Infrared Gas Space Heaters.** There are no energy efficiency standards or energy design standards for oil wall furnaces, oil floor furnaces, or infrared gas space heaters.
- (3) **Combination Space-Heating and Water-Heating Appliances.**
- (A) If part of a combination space-heating and water-heating appliance is a water heater, that part shall comply with the applicable water heater standards in Sections 1605.1(f) and 1605.3(f) of this Article
 - (B) If part of a combination space-heating and water-heating appliance is a furnace, boiler, or other space heater, that part shall comply with the applicable furnace, boiler, or other space heater standards in Sections 1605.1(e) and 1605.3(e) of this Article
 - (C) Water heaters that are federally-regulated appliances, and that are contained in combination space-heating and water-heating appliances that are federally-regulated appliances, are required only to meet the standard for the applicable type of water heater, and are not required to meet any standard for space heaters.
- (4) **Other Gas and Oil Space Heaters.** See Section 1605.1(e) for standards for gas and oil space heaters that are federally-regulated.

(f) Water Heaters.



- (1) **Energy Efficiency Standards for Combination Space-Heating and Water-Heating Appliances.** See section 1605.3(e)(3) of this Article for standards for combination space-heating and water-heating appliances.
- (2) **Other Standards for Water Heaters.** See section 1605.1(f) of this Article for standards for water heaters that are federally regulated.

(g) Pool Heaters, Portable Electric Spas, Residential Pool Pump and Motor Combinations, and Replacement Residential Pool Pump Motors.



- (1) **Energy Design Standard for Natural Gas Pool Heaters.** Natural gas pool heaters shall not be equipped with constant burning pilots.
- (2) **Energy Design Standard for Heat Pump Pool Heaters.** Heat pump pool heaters shall have a readily accessible on-off switch that is mounted on the outside of the heater and that allows shutting off the heater without adjusting the thermostat setting.
- (3) **Energy Efficiency Standard for Heat Pump Pool Heaters.** For heat pump pool heaters manufactured on or after March 1, 2003, the average of the coefficient of performance (COP) at Standard Temperature Rating and the coefficient of performance (COP) at Low Temperature Rating shall be not less than 3.5.

(4) Energy Efficiency Standards for Fossil Fuel-Fired Pool Heaters. See Section 1605.1(g) of this Article for energy efficiency standards for fossil fuel-fired pool heaters that are federally-regulated consumer products.

(5) Residential Pool Pump and Motor Combinations, and Replacement Residential Pool Pump Motors.

(A) **Motor Efficiency.** Pool pump motors manufactured on or after January 1, 2006 may not be split-phase or capacitor start - induction run type.

(B) Two-, Multi-, or Variable-Speed Capability.

1. **Residential Pool Pump Motors.** Residential pool pump motors with a pool pump motor capacity of 1 HP or greater which are manufactured on or after January 1, 2010, shall have the capability of operating at two or more speeds with a low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate. The pump motor must be operated with a pump control that shall have the capability of operating the pump at least at two speeds.
2. **Pump Controls.** Pool pump motor controls manufactured on or after January 1, 2008 that are sold for use with a two- or more speed pump shall have the capability of operating the pool pump at least at two speeds. The control's default circulation speed setting shall be no more than one-half of the motor's maximum rotation rate. Any high speed override capability shall be for a temporary period not to exceed one 24-hour cycle without resetting to default settings.

(6) Replacement Dedicated-Purpose Pool Pump Motors.

(A) All replacement dedicated-purpose pool pump motors manufactured on or after July 19, 2021, shall meet a nominal efficiency at full-load and maximum operating speed of no less than the value shown in Table G-4.

Table G-4: Standards for Replacement Dedicated-Purpose Pool Pump Motors Manufactured on or After July 19, 2021

| Dedicated-purpose pool pump motor total horsepower | Motor Phase | Nominal Efficiency at Full-Load and Maximum Operating Speed |
|--|-------------|---|
| Motor hp < 0.5 hp | Any | 66% |
| 0.5 hp ≤ Motor hp < 1.0 hp | Any | 72% |
| 1.0 hp ≤ Motor hp ≤ 5.0 h | Any | 80% |

(B) Replacement dedicated-purpose pool pump motors with a dedicated-purpose pool pump motor total horsepower greater than or equal to 0.5 hp manufactured on or after July 19, 2021, shall be variable-speed replacement dedicated-purpose pool pump motors.

(C) **Freeze Protection.** All replacement dedicated-purpose pool pump motors manufactured on or after July 19, 2021 with freeze protection controls, shall be shipped with freeze protection disabled or with all of the following default, user-adjustable settings:

1. the default dry-bulb air temperature setting shall not be greater than 40o Fahrenheit (F);
2. the default run time setting shall be no greater than 1 hour (before the temperature is rechecked); and
3. the default motor speed shall not be more than one half of the maximum operating speed of the motor.

(D) **Replacement Dedicated-Purpose Pool Pump Motor Drive.** A pool pump motor drive manufactured on or after July 19, 2021, that is sold with a variable-speed replacement dedicated-purpose pool pump motor shall have the default speed setting of the control set at no more than 55 percent of the maximum operating speed of the motor. Any high-speed override capability shall be for a temporary period not to exceed one 24-hour cycle before automatically resetting to default settings.

(7) Portable Electric Spas.

(A) The normalized standby power, as defined in Section 1604(g)(2)(A)(9) of portable electric spas manufactured on or after January 1, 2006, shall be no greater than 5(V²/3) watts, where V = the fill volume, in gallons.

(B) The normalized standby power, as defined in Table G-3, of portable electric spas manufactured on or after June 1, 2019, shall be no greater than the applicable values shown in Table G-3.

Table G-5
Standards for Portable Electric Spas

| Appliance | Normalized Standby Power Condition | Maximum Standby Power (Watts) |
|--|--|--------------------------------|
| Standard spas and the standard spa portion of combination spas | as defined in Section 6.1 and 6.2 of ANSI/APSP/ICC-14 2014 | $3.75V^{2/3} + 40$ |
| Exercise spas and the exercise spa portion of combination spas | as defined in Section 6.1 and 6.2 of ANSI/APSP/ICC-14 2014 | $3.75V^{2/3} + 40$ |
| Exercise spas and the exercise spa portion of combination spas capable of maintaining a minimum water temperature of 100 ⁰ F for the duration of the test | as defined in Section 6.1 and 6.2 of ANSI/APSP/ICC-14 2014 | $3.75V^{2/3} + 40$ |
| Inflatable spas | as defined in Section 6.1 and 6.2 of ANSI/APSP/ICC-14 2014 | $7(V^{2/3})$ |

Where V = the fill volume, in gallons.

(8) **Dedicated-Purpose Pool Pumps.** See section 1605.1(g)(7) of this Article for standards for dedicated-purpose pool pumps that are federally regulated

(h) **Plumbing Fittings.**



- (1) **Tub Spout Diverters and Showerhead Tub Spout Diverter Combinations.** The leakage rate of tub spout diverters manufactured on or after March 1, 2003, shall be not greater than the applicable values shown in Table H-3.
- (A) **Showerhead tub spout diverter combinations.** Showerhead tub spout diverter combinations shall meet both the standard for showerheads and the standard for tub spout diverters.

Table H-3
Standards for Tub Spout Diverters

| Appliance | Testing Conditions | Maximum Leakage Rate |
|---------------------|----------------------------------|----------------------|
| Tub spout diverters | When new | 0.01 gpm |
| | After 15,000 cycles of diverting | 0.05 gpm |

(2) **Lavatory Faucets and Aerators.** The flow rate of lavatory faucets and lavatory replacement aerators manufactured on or after July 1, 2016 shall be not greater than 1.2 gpm at 60 psi.

(A) Sprayheads with independently controlled orifices and manual controls. The maximum flow rate of each orifice that manually turns on or off shall not exceed the maximum flow rate for a lavatory faucet.

(B) Sprayheads with collectively controlled orifices and manual controls. The maximum flow rate of a sprayhead that manually turns on or off shall be the product of (a) the maximum flow rate for a lavatory faucet and (b) the number of

component lavatories (rim space of the lavatory in inches (millimeters) divided by 20 inches (508 millimeters)).

(3) **Kitchen Faucets and Aerators and Public Lavatory Faucets and Aerators.** The flow rate of kitchen faucets, kitchen replacement aerators, public lavatory faucets, and public lavatory replacement aerators sold or offered for sale on or after January 1, 2016 shall be not greater than the applicable values shown in Table H-4.

(A) For the plumbing fittings identified in Table H-4, noncompliant products may not be sold or offered for sale on or after January 1, 2016, regardless of manufacture date.

*Table H-4
Standards for Kitchen Faucets and Aerators and Public Lavatory Faucets and Aerators*

| Appliance | Maximum Flow Rate |
|--------------------------------------|--|
| Kitchen faucets and aerators | 1.8 gpm w ith optional temporary flow of 2.2 gpm at 60 psi |
| Public lavatory faucets and aerators | 0.5 gpm at 60 psi |

(4) **Commercial Pre-rinse Spray Valves.**

(A) Commercial pre-rinse spray valves manufactured on or after January 1, 2006, shall have a minimum spray force of not less than 4.0 ounces-force (ozf) [113 grams-force (gf)].

(B) See section 1605.1(h) of this Article for water consumption standards for commercial pre-rinse spray valves.

(5) **Showerheads.** The flow rate of showerheads shall be not greater than the applicable values shown in Table H-5.

*Table H-5
Standards for Showerheads*

| Appliance | Maximum Flow Rate | |
|--|---|---------------------------------------|
| | Manufactured on or after July 1, 2016 and prior to July 1, 2018 | Manufactured on or after July 1, 2018 |
| Show erheads | 2.0 gpm at 80 psi ^{1,2, 3} | 1.8 gpm at 80 psi ^{1,2, 3} |
| 1 Maximum flow rate. The maximum flow rate shall be the highest value obtained through testing at a flowing pressure of 80 ± 1 psi and shall not exceed the maximum flow rate in Table H-4 2 Minimum flow rate. The minimum flow rate, determined through testing at a flowing pressure of 20 ± 1 psi, shall be not less than 60 percent of the flow rate reported by the manufacturer pursuant to section 1606(a) of this Article. The minimum flow rate determined through testing at a flowing pressure of 45 and 80 ± 1 psi shall be not less than 75 percent of the flow rate reported by the manufacturer pursuant to section 1606(a) of this article. 3 Shower heads with multiple nozzles. The total flow rate of shower heads with multiple nozzles must be less than or equal to the maximum flow rate in Table H-5 when any or all the nozzles are in use at the same time. | | |

(6) **Other Plumbing Fittings.** See Section 1605.1(h) for water efficiency standards for plumbing fittings that are federally-regulated.

(i) **Plumbing Fixtures.**



- (1) The water consumption of water closets, and urinals, other than those designed and marketed exclusively for use at prisons or mental health care facilities, shall be no greater than the values shown in Table I.

Table I
Standards for Plumbing Fixtures

| Appliance | Maximum Gallons per Flush or Dual-Flush effective flush volume |
|----------------------|---|
| | Sold or offered for sale on or after January 1, 2016 ¹ |
| All water closets | 1.28 |
| Trough-type urinals | trough length (inches)/16 |
| Wall mounted urinals | 0.125 |
| Other urinals | 0.5 |

¹For the items identified in Table I-2, noncompliant products may not be sold or offered for sale on or after the designated date, regardless of manufacture date.

- (2) Water closets sold or offered for sale after January 1,2016, shall pass the Waste Extraction Test (Section 7.10) of ASME A112.19.2/CSA B45.1-2013

(j) Fluorescent Lamp Ballasts and Deep-Dimming Fluorescent Lamp Ballasts.



- (1) Deep-Dimming Fluorescent Lamp Ballasts. Deep-dimming fluorescent lamp ballasts manufactured on or after July 1, 2016 shall meet the following energy conservation standards:
 - (A) Shall not consume more than 1 watt in standby mode;
 - (B) Shall have a power factor of 0.9 or greater; and
 - (C) Shall have a weighted ballast luminous efficacy greater than or equal to the threshold described in the following equation:

$$\text{Weighted Ballast Luminous Efficacy} \geq \frac{AP_{100} *}{AP_{100} \times 1.091 + 7.55}$$

AP₁₀₀ is shorthand for maximum arc power as defined in section 1604(j) and discussed in section 1604(j)(2) of this Article.

- (2) See Section 1605.1(j)of this Article for energy efficiency standards for fluorescent lamp ballasts that are federally-regulated consumer products.

(k) Lamps.



(1) General Service Lamps.

- (A) General service lamps manufactured on or after January 1, 2018, and sold before January 1, 2020 shall meet the standards shown in Table K-8.

*Table K-8
Standards for State-Regulated General Service Lamps -Tier II*

| Lumen Ranges | Minimum Lamp Efficacy | Minimum Rated Lifetime | Effective Date |
|--------------|-----------------------|------------------------|---|
| 310-2,600 | 45 lumens per watt | 1,000 Hours | Manufactured on or after January 1, 2018, and sold before January 1, 2020 |

(B) General service lamps sold on or after January 1, 2020, shall have a minimum lamp efficacy of 45 lumens per watt.

(2) State-regulated LED lamps

(A) State-regulated LED lamps with lumen output of 150 lumens or greater for E12 bases, or 200 lumens or greater for E17, E26 and GU24 bases, and manufactured on or after January 1, 2018, shall meet all of the standards shown in Table K-9 and shall have the following:

1. A color point that meets the requirements in Table B1 of Annex B of ANSI C78.377-2015 for color targets and color consistency.
2. A CRI (Ra) of 82 or greater.
3. Individual color scores of R1, R2, R3, R4, R5, R6, R7, and R8 of 72 or greater.
4. A power factor of 0.7 or greater.
5. A rated life of 10,000 hours or greater as determined by the “time to failure” portion of the test procedure specified in section 1604(k)(3) of this Article.
6. State-regulated LED lamps that have an ANSI standard lamp shape of A shall meet the omnidirectional light distribution requirements of ENERGY STAR's Product Specification for Lamps Version 2.0 (December 2015).
7. State-regulated LED lamps that have an ANSI standard lamp shape of B, BA, C, CA, F, or G shall meet the decorative light distribution requirements of ENERGY STAR's Product Specification for Lamps Version 1.1 (August 2014).

(B) In addition to the requirements in section 1605.3(k)(2)(A) of this Article, state-regulated LED lamps manufactured on or after July 1, 2019 shall have a standby mode power of 0.2 watt or less.

*Table K-9
Standards for State-regulated LED Lamps*

| Effective Date | Minimum Compliance Score | Minimum Efficacy Lumens per Watt |
|---|--------------------------|----------------------------------|
| January 1, 2018 | 282 | 68 |
| July 1, 2019 | 297 | 80 |
| The compliance score shall be calculated as the sum of the efficacy and 2.3 times the CRI of the lamp | | |

(3) **State-regulated Small Diameter Directional Lamps.** State-regulated small diameter directional lamps manufactured on or after January 1, 2018 must have a rated life of 25,000 hours or greater as determined by the “time to failure” test procedure specified in section 1604(k)(3) of this Article and meet one of the following requirements:

- (A) have luminous efficacy of at least 80 lumens per watt.
- (B) have a minimum luminous efficacy of 70 lumens per watt or greater and a minimum compliance score of 165 or greater, where compliance is calculated as the sum of the luminous efficacy and CRI.

(4) GU24 Base Lamps. GU24 base lamps shall not be incandescent lamps.

(5) See section 1605.1(k) of this Article for energy efficiency standards for federally regulated lamps.

(I) Emergency Lighting.



(1) **Illuminated Exit Signs.** See Section 1605.1(l) for energy efficiency standards for illuminated exit signs.

(m) Traffic Signal Modules.



(1) **Traffic Signal Modules for Pedestrian Control.** The power consumption of traffic signal modules for pedestrian control manufactured on or after January 1, 2006 shall be not greater than the applicable values shown in Table M-2 when tested at the temperatures shown.

*Table M-2
Standards for Traffic Signal Modules for Pedestrian Control
Sold or Offered for Sale in California*

| Type | At 25°C (77°F) | At 74°C (165.2°F) |
|---|----------------|-------------------|
| Hand or 'Don't Walk' sign or countdown n. | 10 watts | 12 watts |
| Walking Person or 'Walk' sign | 9 watts | 12 watts |

(2) See Section 1605.1(m) for energy efficiency standards for federally regulated traffic signal modules for vehicle control and federally regulated traffic signal modules for pedestrian control.

(n) Luminaires and Torchieres.



(1) **Energy Efficiency Standard for Metal Halide Luminaires.** Metal halide luminaires rated at least partially within the range of 150 to 500 watts shall not have probe-start ballasts and shall comply with Section 1605.3(n)(1)(A) as applicable:

(A) The requirements for metal halide luminaires are as follows:

1. Indoor metal halide luminaires manufactured on or after January 1, 2010 shall comply with at least one compliance option of Section 1605.3(n)(1)(B).
2. Indoor metal halide luminaires manufactured on or after January 1, 2015 shall comply with Section 1605.3(n)(1)(B)4, and shall also comply with at least one other compliance option of Section 1605.3(n)(1)(B).
3. Outdoor metal halide luminaires manufactured on or after January 1, 2010, may comply with Section 1605.3(n)(1)(B)3, and shall comply with at least one other compliance option of Section 1605.3(n)(1)(B).

(B) Metal halide luminaires shall meet one of the following compliance options:

1. A minimum ballast efficiency of:
 - a. 90 percent for 150 to 250 watt lamps; or
 - b. 92 percent for 251 to 500 watt lamps.
2. A minimum ballast efficiency of 88 percent and an occupant sensor which is an integral control as defined in Section 1602(n) of this Article, shipped with the factory default setting to automatically reduce lamp power through dimming by a minimum of 40 percent within 30 minutes or less after an area has been vacated;
3. A minimum ballast efficiency of 88 percent and an automatic daylight control which is an integral control as defined in Section 1602(n) of this Article, shipped with the factory default setting to automatically reduce lamp power through dimming by a minimum of 40 percent;
4. A minimum ballast efficiency of 88 percent and a relamping rated wattage within only one of the four wattage bins specified in subsections (i) through (iv) below. The luminaire shall be able to operate lamps within only one of the four

wattage bins and shall not be rated for any lamp wattage outside of that wattage bin. The luminaire shall have a permanent, pre-printed factory-installed label that states the relamping rated wattage.

- i. 150-160 watts; or
- ii. 200-215 watts; or
- iii. 290-335 watts
- iii. 336-500 watts, provided that when a luminaire is able to operate 336 to 500 watt lamps, the luminaire shall be prepackaged and sold together with at least one lamp per socket, having a minimum lamp mean efficacy of 80 lumens per watt based on published mean lumens and rated lamp power (watts).

(C) Federally Regulated Metal Halide Luminaires. See section 1602(n) of this Article for energy efficiency standards for metal halide luminaires rated under 150 W and above 500 W.

EXCEPTIONS to Sections 1605.3(n)(1): The following metal halide lighting systems shall not have probe-start ballasts and are not required to meet the minimum ballast efficiency requirements:

1. Luminaires that use regulated lag ballasts;
2. Luminaires that use electronic ballasts which operate at 480 volts; or
3. Luminaires that meet all three of the following requirements:
 - a. Are rated for use only with 150 watt lamps, and
 - b. Are rated for use in wet locations, as specified by the National Electrical Code 2002, Section 410.4(A); and
 - c. Contain a ballast that is rated to operate at ambient air temperatures above 50 degrees C, as specified by UL 1029-2001.

(2) **Energy Efficiency Standards for Under-Cabinet Luminaires.** Under-cabinet luminaires that are equipped with T-8 fluorescent lamps and that are designed to be attached to office furniture and that are manufactured on or after January 1, 2006 shall be equipped with ballasts that have a ballast efficacy factor not less than the applicable values shown in Table N-2.

Under-cabinet luminaires that are equipped with GU-24 sockets manufactured on or after January 1, 2010 shall not be rated for use with incandescent lamps of any type, including line voltage or low voltage.

EXCEPTION 1 to Section 1605.3(n)(2): Section 1605.3(n)(2) does not apply to luminaires equipped with T-8 ballasts designed for dimming.

EXCEPTION 2 to Section 1605.3(n)(2):

Section 1605.3(n)(2) does not apply to luminaires that are:

- (a) specifically and exclusively designed for use in applications where electromagnetic interference from electronic ballasts would interfere with critical, sensitive instrumentation and equipment such as medical imaging devices; and
- (b) clearly, legibly, and permanently labeled, in at least 12 point type and in a place likely to be seen by the purchaser and the installer, "This 'luminaire' or 'fixture' is intended exclusively for use in applications where critical, sensitive equipment would be adversely affected by electronic lamp ballast electromagnetic radiation".

*Table N-2
Standards for Under-Cabinet Luminaires*

| Lamp Length (inches) | Minimum Ballast Efficacy Factor (BEF) for one lamp | Minimum Ballast Efficacy Factor (BEF) for two lamps |
|----------------------|--|---|
| ≤29 | 4.70 | 2.80 |
| ≥29 and ≤35 | 3.95 | 2.30 |
| ≥35 and ≤41 | 3.40 | 1.90 |
| ≥41 and ≤47 | 3.05 | 1.65 |
| ≥47 | 2.80 | 1.45 |

(3) Portable Luminaires.

(A) Portable luminaires manufactured on or after January 1, 2010 shall meet one or more of the following requirements:

1. Be equipped with a dedicated fluorescent lamp socket connected to a high frequency electronic ballast contained within the portable luminaire;
2. Be equipped with one or more GU-24 line-voltage sockets and not rated for use with incandescent lamps of any type, including line voltage or low voltage;
3. Be an LED luminaire or a portable luminaire with an LED light engine with integral heat sink, and comply with the minimum requirements shown in Table N-3;

*Table N-3
Minimum Requirements for Portable LED Luminaires and
Portable Luminaires with LED Light Engines with Integral Heat Sink*

| Criteria | Requirement |
|---|-----------------------|
| Minimum LED Luminaire Efficacy | 29 lumens/W |
| Minimum LED Light Engine Efficacy | 40 lumens/W |
| Correlated Color Temperature (CCT) | 2700 K through 5000 K |
| Minimum Color Rendering Index (CRI) | 75 |
| Power Factor (for luminaires labeled or sold for residential use) | ≥ 0.70 |

4. Be equipped with an E12, E17, or E26 screw-based socket and be prepackaged and sold together with one screw-based compact fluorescent lamp or screw-based LED lamp for each screw-based socket on the portable luminaire. The compact fluorescent or LED lamps which are prepackaged with the portable luminaire shall be fully compatible with the luminaire controls, meaning that portable luminaires having a dimmer control shall be prepackaged with dimmable compact fluorescent or LED lamps, and portable luminaires having 3-way controls shall be prepackaged with 3-way compact fluorescent or LED lamps. The compact fluorescent lamps which are prepackaged with the luminaires shall also meet the minimum energy efficiency levels established by ENERGY STAR® for compact fluorescent lamps in effect on December 31, 2008. The LED lamps required to be packaged with the luminaire shall comply with the minimum requirements for state-regulated LED lamps in sections 1601 through 1607 of this article;
5. Be equipped with one or more single-ended, non-screw based halogen lamp sockets (line or low voltage), a dimmer control or high low control, and be rated for a maximum of 100W.

EXCEPTIONS to Section 1605.3(n)(3). The following portable luminaires are not required to be prepackaged and sold together with compact fluorescent or LED lamps:

1. Portable Wall Mount Adjustable Luminaires that meet all of the following requirements: Designed only to be mounted on a wall, having no base which will allow the luminaire to stand on a horizontal surface, having an articulated arm, having a maximum overall length of 24 inches in any direction, fitted only with a single E-12, E-17 or E-26 lamp socket per luminaire, and controlled with an integral dimmer. Luminaires manufactured on or before December 31, 2011 shall have a maximum relamping rated wattage of 57 watts, and luminaires manufactured on or after January 1, 2012 shall have a maximum relamping rated wattage of 43 watts, as listed on a permanent pre-printed factory-installed label in accordance with Underwriters Laboratories (UL) 153.
2. Art Work Luminaires that meet all of the following requirements: Designed only to be mounted directly to art work only for the purpose of illuminating that art work, fitted only with E-12 screw-base line-voltage sockets, having no more than three sockets per luminaire, and controlled with an integral high/low switch. Luminaires with a single socket shall have a maximum relamping rated wattage of 25 watts, and luminaires with two or three sockets shall have a maximum relamping rated wattage of 15 watts per socket, as listed on a permanent pre-printed factory-installed label in accordance with Underwriters Laboratories (UL) 153.

(B) Portable luminaires that have internal power supplies shall have zero standby power when the luminaire is turned off.

- (4) GU-24 adaptors. GU-24 adaptors manufactured on or after January 1, 2010 shall not adapt a GU-24 socket to any other line voltage socket.

(5) See Section 1605.1(n) for energy efficiency standards for federally regulated metal halide lamp fixtures manufactured on or after January 1, 2009, and torchieres.

(o) Dishwashers.



See Section 1605.1(o) for energy efficiency standards for dishwashers that are federally-regulated consumer products.

(p) Clothes Washers.



Energy Efficiency and Water Efficiency Standards for Residential and Commercial Clothes Washers. See section 1605.1(p) of this Article for energy efficiency and water efficiency standards for residential and commercial clothes washers.

(q) Clothes Dryers.



See Section 1605.1(q) for energy efficiency standards and energy design standards for clothes dryers that are federally-regulated consumer products.

(r) Cooking Products and Food Service Equipment.



- (1) **Energy Standards for Food Service Equipment.** There is no energy efficiency standard or energy design standard for food service equipment other than commercial hot food holding cabinets.
- (2) **Energy Efficiency Standards for Commercial Hot Food Holding Cabinets.** The idle energy rate of commercial hot food holding cabinets manufactured on or after January 1, 2006 shall be no greater than 40 watts per cubic foot of measured interior volume.
- (3) **Cooking Products.** See Section 1605.1(r) for energy efficiency standards and energy design standards for cooking products that are federally-regulated consumer products.

(s) Electric Motors.



- (1) Electric Motors. See section 1605.1(s)(1) of this Article for energy efficiency standards for electric motors that are federally regulated commercial and industrial equipment.
- (2) Compressors. State-regulated compressors manufactured on or after January 1, 2022, shall meet the applicable performance values in Table S-5.

Table S-5 Standards for State-regulated Compressors.

| Equipment Class | Minimum Package Isentropic Efficiency ¹ | η_{Regr} (package isentropic | d (Percentage |
|-----------------|--|---|------------------|
|-----------------|--|---|------------------|

| | | efficiency reference curve) | Loss Reduction) |
|--|---|--|-----------------|
| Rotary, lubricated, air-cooled, fixed-speed compressor | $\eta_{Regr.} + (1 - \eta_{Regr.}) * (d/100)$ | $-0.00928 * \ln^2(.4719 * V_1) + 0.13911 * \ln(.4719 * V_1) + 0.27110$ | -15 |
| Rotary, lubricated, air-cooled, variable-speed compressor | $\eta_{Regr.} + (1 - \eta_{Regr.}) * (d/100)$ | $-0.01549 * \ln^2(.4719 * V_1) + 0.21573 * \ln(.4719 * V_1) + 0.00905$ | -10 |
| Rotary, lubricated, liquid-cooled, fixed-speed compressor | $\frac{.02349 + \eta_{Regr.} + (1 - \eta_{Regr.}) * (d/100)}{\eta_{Regr.}}$ | $-0.00928 * \ln^2(.4719 * V_1) + 0.13911 * \ln(.4719 * V_1) + 0.27110$ | -15 |
| Rotary, lubricated, liquid-cooled, variable-speed compressor | $\frac{.02349 + \eta_{Regr.} + (1 - \eta_{Regr.}) * (d/100)}{\eta_{Regr.}}$ | $-0.01549 * \ln^2(.4719 * V_1) + 0.21573 * \ln(.4719 * V_1) + 0.00905$ | -15 |

Where V_1 is the full-load actual volume flow rate of the compressor, in cubic feet per minute, as determined in accordance with the test procedure in section 1604(s).

¹For "fixed-speed compressor" equipment classes, the relevant Package Isentropic Efficiency is Full-load Package Isentropic Efficiency. For "Variable-speed compressor" equipment classes, the relevant Package Isentropic Efficiency is Part-load Package Isentropic Efficiency. Both Full- and Part- Load Package Isentropic Efficiency are determined in accordance with the test procedure in section 1604(s) of this Article.

(t) Distribution Transformers.



See Section 1605.1(t) for energy efficiency standards for low-voltage dry-type distribution transformers, liquid-immersed distribution transformers, and medium-voltage dry-type distribution transformers.

(u) External Power Supplies.



- (1) The efficiency in the active mode of state-regulated external power supplies, manufactured on or after July 1, 2008 when tested at 115 volts at 60 Hz, shall be not less than the applicable values shown (expressed as the decimal equivalent of a percentage); and the energy consumption in the no-load mode of power supplies manufactured on or after the effective dates when tested at 115 volts at 60 Hz, shown shall be not greater 0.5 Watts.

*Table U-4
Standards for State-Regulated External Power Supplies
Effective July 1, 2008*

| Nameplate Output | Minimum Efficiency in Active Mode |
|--------------------|--|
| < 1 watt | 0.5 * Nameplate Output |
| ≥ 1 and ≤ 51 watts | 0.09 * Ln(Nameplate Output) + 0.5 |
| > 51 watts | 0.85 |
| | Maximum Energy Consumption in No- Load Mode |
| Any output | 0.5 watts |

Where Ln (Nameplate Output) = Natural Logarithm of the nameplate output

expressed in watts.

(2) See section 1605.1(u) of this Article for energy efficiency standards for federally regulated external power supplies.

(v) Computers, Computer Monitors, Televisions, Signage Displays, and Consumer Audio and Video Equipment.



(1) **Consumer Audio and Video Equipment.** The power usage of consumer audio and video equipment manufactured on or after the effective dates shown shall be not greater than the applicable values shown in Table V-2. For equipment that consists of more than one individually powered product, each with a separate main plug, the individually powered products shall each have a power usage not greater than the applicable values shown in Table V-2.

*Table V-2
Standards for Consumer Audio and Video Equipment*

| Appliance Type | Effective Date | Maximum Power Usage (Watts) |
|---|-----------------|---|
| Compact Audio Products | January 1, 2007 | 2 W in Audio standby-passive mode for those without a permanently illuminated clock display 4 W in Audio standby-passive mode for those with a permanently illuminated clock display |
| Digital Versatile Disc Players and Digital Versatile Disc Recorders | January 1, 2006 | 3 W in Video standby-passive mode |

(2) **Televisions and Signage Displays.** All televisions and signage displays manufactured on or after the effective dates shall meet the requirements shown in Table V-3.

(3) **Televisions and signage displays** manufactured on or after January 1, 2011. In addition, televisions and signage displays manufactured on or after January 1, 2011 shall meet the requirements shown in 1605.3(v)(3)(A) and 1605.3(v)(3)(B) and 1605.3(v)(3)(C) of this Article.

(A) A television or signage display shall automatically enter TV standby-passive mode or standby-active mode after a maximum of 15 minutes without video or audio input on the selected input mode.

(B) A television or signage display shall enter TV standby-passive mode when turned off by remote or integrated button/switch.

(C) The peak luminance of the product in “home” mode, or in the default mode as shipped, shall not be less than 65% of the peak luminance of the “retail” mode, or the brightest selectable preset mode, of the product.

*Table V-3
Standards for Televisions and Signage Displays*

| Effective Date | Screen Size (area A in square inches) | Maximum TV and Signage Display Standby- passive Mode Power Usage (watts) | Maximum On Mode Power Usage (P in Watts) | Minimum Power Factor for (P ≥ 100W) |
|-----------------|---------------------------------------|--|--|-------------------------------------|
| January 1, 2006 | All | 3 W | No standard | No standard |
| January 1, 2013 | A < 1400 | 1 W | $P \leq 0.12 \times A + 25$ | 0.9 |

EXCEPTIONS to sections 1605.3(v)(2) and 1605.3(v)(3): The standards found in sections 1605.3(v)(2) and 1605.3(v)(3) of this Article do not apply to professional signage displays.

4) **Computer monitors.** Computer monitors manufactured on or after July 1, 2019, shall comply with all of the following:

(A) The computer monitor on-mode power draw shall be less than or equal to the following equation with each of the applicable allowances applied at most once:

$$E_{on} \leq (E_{on_max} + E_{EP} + E_{Game} + E_{OLED} + E_{Curve})$$

Where:

E_{on} is the computer monitor on-mode power draw in watts as determined under Section 1604(v)(3) of this Article,

E_{on_max} is the maximum on-mode power draw in watts as determined by Table V-4,

E_{EP} is the enhanced performance display allowance in watts as determined in Table V-5,

E_{Game} is the gaming monitor allowance in watts as determined in Table V-5,

E_{OLED} is the OLED monitor allowance in watts as determined in Table V-5, and

E_{Curve} is the curved monitor allowance in watts as determined in Table V-5.

(B) Consume less than or equal to 1.2 watts in computer monitor sleep mode and computer monitor off mode power combined.

(C) Be shipped with a screen luminance less than or equal to $200 \text{ cd/m}^2 \pm 35$ percent. A manufacturer may ship with additional features enabled, even if they were turned off in testing.

(D) Computer monitors with touch screen capability are allowed an additional 1 watt allowance per mode in modes where touch functionality is enabled

*Table V-4
Power Consumption Standards for Computer Monitors*

| Resolution in megapixels (MP) | Diagonal Screen Size (d) in Inches | Maximum Computer Monitor On Mode Power Consumption in Watts |
|--|------------------------------------|---|
| ≤ 5.0 MP | 17"≤d≤20" | $[(6.0*r) + (0.025*A) + 3.7]$ |
| | 20"<d<23" | $[(4.2*r) + (0.02*A) + 2.2]$ |
| | 23"≤d<25" | $[(4.2*r) + (0.04*A) - 2.4]$ |
| | 25"≤d<30" | $[(4.2*r) + (0.07*A) - 10.2]$ |
| | 30"≤d≤61" | $[(6.0*r) + (0.1*A) - 14.5]$ |
| >5.0 MP | 17"≤d≤20" | $[25+ (0.025*A) + 3.7]$ |
| | 20"<d<23" | $[25 + (0.02*A) + 2.2]$ |
| | 23"≤d<25" | $[25 + (0.04*A) - 2.4]$ |
| | 25"≤d<30" | $[25 + (0.07*A) - 10.2]$ |
| | 30"≤d≤61" | $[25 + (0.01*A) - 14.5]$ |
| Where: "A" is the monitor screen area in square inches "d" is the diagonal measurement of the display in inches "r" is the megapixel resolution of the display. | | |

*Table V-5
List of Potentially Applicable Allowances*

| Allowance | Computer Monitor Type | Models manufactured on or after July 1, 2019, and before January 1, 2021 | Models manufactured on or after January 1, 2021, |
|-----------|---|--|--|
| E_{EP} | Enhanced Performance Display with a color gamut support of 32.9% of | .3 * E_{on_max} | .2 * E_{on_max} |

| | | | |
|--------------------|---|---------------------------|--|
| | CIELUV or greater (99% or more of defined sRGB colors) | | |
| | Enhanced Performance Display with a color gamut support of 38.4% of CIELUV or greater (99% or more of defined Adobe RGB colors) | .75 * E _{on_max} | .6 * E _{on_max} |
| E _{Game} | Gaming Monitors without incremental hardware-based assistance | .3 * E _{on_max} | .2 * E _{on_max} |
| | Gaming Monitors with incremental hardware-based assistance | .35 * E _{on_max} | .3 * E _{on_max} |
| E _{FRRG} | Fast refresh rate gaming monitor with MRR less than 480 Hertz | 0 | [0.0025* (MRR-300) + 0.25] * E _{on_max} |
| | Fast refresh rate gaming monitor with MRR of 480 Hertz or more | 0 | 0.7 * E _{on_max} |
| E _{OLED} | OLED monitor | .3 * E _{on_max} | .2 * E _{on_max} |
| E _{Curve} | Curved Monitor | .3 * E _{on_max} | .2 * E _{on_max} |

EXCEPTIONS to Section 1605.3(v)(4): The following computer monitors are not required to comply with Section 1605.3(v)(4) but shall comply with the test procedures in Section 1604(v)(4), the certification requirements in Section 1606, and the marking requirements in Section 1607:

1. KVMs.
2. KMMs.
3. Very high performance monitors.

EXCEPTION to Section 1605.3(v)(4): Medical computer monitors are not required to comply with Section 1605.3(v)(4) or the test procedures in Section 1604(v)(4) but shall comply with the certification requirements in Section 1606 and the marking requirements in Section Section 1607.

(5) **Desktop computers, thin clients, mobile gaming systems**, portable all-in-ones, and notebook computers. Desktop computers, thin clients, mobile gaming systems, portable all-in-ones, and notebook computers manufactured on or after January 1, 2019, shall:

(A) Comply with Table V-7; and

(B) Be shipped with power management settings that do both of the following:

1. Transition the computer into either the computer sleep mode or computer off mode measured in Section 1604(v)(4) of this Article within 30 minutes of user inactivity. If the transition is to a computer sleep mode, that sleep mode shall either:
 - a. Be a computer sleep mode as described in ACPI as S3; or
 - b. Consume power less than or equal to the values shown in Table V-6.
2. Transition connected displays into sleep mode within 15 minutes of user inactivity.

EXCEPTION to section 1605.3(v)(5)(B). If the model is shipped at the purchaser's request with either a limited capability operating system or without an operating system, or if the model is not capable of having an operating system, the model is not required to comply with section 1605.3(v)(5)(B) of this Article.

EXCEPTION to section 1605.3(v)(5)(A). Desktop computers and thin clients assembled before July 1, 2021, entirely from parts manufactured before September 1, 2018, are not required to comply with section 1605.3(v)(5)(A) of this Article.

*Table V-6
Alternative Computer Sleep Mode Power Limits*

| Computer Type | Maximum Power Consumption (watts) |
|--|--|
| Workstations, Mobile Workstations, High Expandability Computers, Small Servers | $10 + 0.03 * C$ where C is the system memory capacity in gigabytes minus 32 gigabytes. If C is less than zero, use zero for the value of C. |
| Desktop Computers, Thin Clients, Mobile Gaming Systems | $5 + 0.03 * C$ where C is the system memory capacity in gigabytes minus 32 gigabytes. If C is less than zero, use zero for the value of C. |
| Notebook Computers, Portable All-In-Ones | $2.5 + 0.03 * C$ where C is the system memory capacity in gigabytes minus 16 gigabytes. If C is less than zero, use zero for the value of C. If a discrete GPU is present in the system, the maximum power consumption limit shall be increased by an additional 2 watts |

*Table V-7
Energy Consumption Standards for Desktop Computers, Thin Clients, Notebook Computers, Mobile Gaming Systems, and Portable All-in-Ones*

| Computer Type | For models manufactured on or after January 1, 2019, and before July 1, 2021, the measured annual energy consumption shall be less than or equal to the values below. | For models manufactured on or after July 1, 2021, the measured annual energy consumption shall be less than or equal to the values below. |
|--|---|---|
| Desktop Computers, mobile gaming systems, and thin clients with an ES of 250 or less | 50 kWh/yr + applicable adders in Table V-8 | 50 kWh/yr + applicable adders in Table V-8 |
| Desktop Computers, mobile gaming systems, and thin clients with an ES more than 250 but no more than 425 | 80 kWh/yr + applicable adders in Table V-8 | 60 kWh/yr + applicable adders in Table V-8 |
| Desktop Computers, mobile gaming systems, and thin clients with an ES more than 425 but no more than 690 | 100 kWh/yr + applicable adders in Table V-8 | 75 kWh/yr + applicable adders in Table V-8 |
| Notebook Computers and portable all-in -ones | 30 kWh/yr + applicable adders in Table V-8 | 30 kWh/yr + applicable adders in Table V-8 |
| Minimum power factor of a computer power supply that is not a federally-regulated external power supply | 0.9 measured at full load | 0.9 measured at full load |

*Table V-8
List of Potentially Applicable Adders*

| Function | Desktop Computer, Mobile Gaming System, and Thin Client Adder (kWh/yr) | Notebook Computers and Portable All-In-One Adder (kWh/yr) |
|---|--|---|
| System Memory | $4 + 0.15 * C$ Where C is the capacity in GB. | $4 + 0.15 * C$ Where C is the capacity in GB. |
| Energy-Efficient Ethernet | 0.9 per computer | 0.9 per computer |
| Storage device other than main storage device | 3.5-inch Drive: 26 | 2.6 per storage device |

| | | |
|--|---|--|
| | <p>2.5-inch Drive: 4.5 Solid State Drive (SSD): 0.5 Solid State Hybrid Drive (SSHD): 1.0 Other: 26 per storage device</p> | |
| <p>Integrated Display Where: "d" is the diagonal measurement of the display in inches "r" is the megapixel resolution of the display "A" is the monitor screen area in square inches EP=0 for displays that are not enhanced performance displays</p> | <p>For $d \leq 20$: $(8.76 * 0.35 * (1 + EP) * [(4.2 * r) + 5.7]) * 0.8$ For $20 < d < 23$: $(8.76 * 0.35 * (1 + EP) * [(4.2 * r) + (0.02 * A) + 2.2]) * 0.8$ For $23 \leq d < 25$: $(8.76 * 0.35 * (1 + EP) * [(4.2 * r) + (0.04 * A) - 2.4]) * 0.8$ For $25 \leq d$: $(8.76 * 0.35 * (1 + EP) * [(4.2 * r) + (0.07 * A) - 10.2]) * 0.8$ $r=6$ for resolutions greater than 6 megapixels Before July 1, 2021: EP=0.3 for displays with a color gamut support of 32.9% of CIELUV or greater (99% or more of defined sRGB colors); and EP=0.75 for displays with a color gamut support of 38.4% of CIELUV or greater (99% or more of defined Adobe RGB colors) On or after July 1, 2021: EP=0.2 for displays with a color gamut support of 32.9% of CIELUV or greater (99% or more of defined sRGB colors); and EP=0.6 for displays with a color gamut support of 38.4% of CIELUV or greater (99% or more of defined Adobe RGB colors)</p> | <p>$(8.76 * 0.3 * (1 + EP) * [(0.43 * r) + (0.0263 * A)])$ $r=6$ for resolutions greater than 6 megapixels EP+0.4 for displays with a color gamut support of 38.4% of CIELUV or greater (99% or more of defined Adobe RGB colors).</p> |
| <p>For a multi-screen notebook, this adder is applied for each integrated display that is enabled when shipped and shall show the same test image during testing.</p> | <p>For $25 < d$: $(8.76 * 0.35 * (1 + EP) * [(4.2 * r) + (0.07 * A) - 10.2]) * 0.8$ $r=6$ for resolutions greater than 6 megapixels Before July 1, 2021: EP=0.3 for displays with a color gamut support of 32.9% of CIELUV or greater (99% or more of defined sRGB colors); and EP=0.75 for displays with a color gamut support of 38.4% of CIELUV or greater (99% or more of defined Adobe RGB colors). On or after July 1, 2021: EP=0.2 for displays with a color gamut support of 32.9% of CIELUV or greater (99% or more of defined sRGB colors); and EP=0.6 for displays with a color gamut support of 38.4% of CIELUV or greater (99% or more of defined Adobe RGB colors).*</p> | |
| <p>First discrete GPU that is not packaged on the same substrate as the CPU (on or after January 1, 2019 and before July 1, 2021) Where "B" is frame buffer bandwidth measured in GB/s</p> | <p>$58.6 * \tanh(0.0038 * B - 0.137) + 26.8$</p> | <p>$29.3 * \tanh(0.0038 * B - 0.137) + 13.4$</p> |
| <p>First discrete GPU that is not packaged on the same substrate as the CPU (on or after July 1, 2021) Where "B" is frame buffer bandwidth measured in GB/s</p> | <p>$29.4 * \tanh(0.008 * B - 0.03) + 11 + (0.011 * B)$</p> | <p>$14.7 * \tanh(0.008 * B - 0.03) + 5.5 + (0.0055 * B)$</p> |

| | | |
|---|---|---|
| First discrete GPU that is packaged on the same substrate as the CPU (on or after July 1, 2021) Where "B" is frame buffer bandwidth measured in GB/s | $29.4 * \tanh(0.008 * B - 0.03) + 11 + (0.011 * B)$ | $14.7 * \tanh(0.008 * B - 0.03) + 5.5 + (0.0055 * B)$ |
| Additional Discrete GPU | 11 per GPU | 5.5 per GPU |
| Add-in Cards This adder does not apply if either of the following criteria is met: 1) An adder is claimed for a device connected through this add-in-card; or 2) An interface score from Table V-1 applies to a slot or interface provided by this add-in-card | 10 per card | 5 per card |
| Video Surveillance Card | 25 per card | 12.5 per card |
| Wired Ethernet with a transmit rate of greater than 1 Gb/s and less than 10 Gb/s that is not an Add-in card | 4 per computer | 0 |
| Wired Ethernet or Fiber Card with a transmit rate of 10 Gb/s or greater | 25 per card | 12.5 per card |
| High bandwidth system memory, where "S" is system memory bandwidth measured in GBs. This adder does not apply to a computer that meets any of the following criteria: 1) Expandability score includes a credit for 4-channel memory. 2) System memory bandwidth is less than 146 GB/s 3) Less than 4 GB of the system memory has a bandwidth of 146 GB/s or more and either: a) Has an integrated display with a resolution of 9 megapixels or less; or b) Does not have an integrated display. 4) Uses an adder for a first discrete GPU. | $22.78 * \tanh[0.006 * (S - 70) + 0.15] - 12.33$ | $9.11 * \tanh[0.006 * (S - 70) + 0.15] - 4.45$ |

- (6) Small-scale servers, high expandability computers, mobile workstations, and workstations. Small-scale servers, high expandability computers, mobile workstations, and workstations manufactured on or after January 1, 2018, shall:
- (A) Be powered by an internal power supply that meets or exceeds the standards in Table V-9, or an external power supply that meets the level VI of efficiency described in the *International Efficiency Marking Protocol for External Power Supplies Version 3.0* (Sept. 2013);
 - (B) Incorporate Energy-Efficient Ethernet functionality;
 - (C) Transition connected displays into sleep mode within 15 minutes of user inactivity; and
 - (D) Transition the computer into either the computer sleep mode or computer off mode measured in Section 1604(v)(5) within 30 minutes of user inactivity. If the transition is to a computer sleep mode, that sleep mode shall either:
 - 1. Be a computer sleep mode as described in ACPI as S3; or
 - 2. Consume power less than or equal to the values shown in Table V-6.
- EXCEPTION: to section 1605.3(v)(6)(D): Small-scale servers and rack-mounted workstations are not required to comply with section 1605.3(v)(6)(D) of this Article.

Table V-9
Internal Power Supply Requirements

| 115V power supplies | | | | |
|---------------------|----------|----------|-----------|-------------------------|
| 10% load | 20% load | 50% load | 100% load | Power Factor Correction |
| -- | 87% | 90% | 87% | 0.9 at 50% load |
| 230V power supplies | | | | |
| 10% load | 20% load | 50% load | 100% load | Power Factor Correction |
| -- | 88% | 92% | 88% | 0.9 at 50% load |

(7) Small volume manufacturers.

(A) Computers manufactured on or after January 1, 2019, by a small volume manufacturer shall:

1. Comply with the power management settings identified in Sections 1605.3(v)(5)(B)(2) and 1605.3(v)(6)(C);
2. Be shipped with power management settings that transition the computer into either computer sleep mode or computer off mode within 30 minutes of user inactivity; and
3. Be exempt from all other requirements for computers unless the small volume manufacturer meets the criteria in Section 1605.3(v)(7)(C).

(B) Small-scale servers and rack-mounted workstations are not required to comply with Section 1605.3(v)(7)(A)(2) of this article.

(C) If a small volume manufacturer produces desktop or workstation computers in quantities of more than 50 units of a basic model, the manufacturer shall certify those units as meeting the requirements in Sections 1603, 1604(v)(5), 1605.3(v)(5) or 1605.3(v)(6), Section 1606, and Section 1607.

(w) Battery Charger Systems.



(1) **Energy Efficiency Standards for Large Battery Charger Systems.** Large battery charger systems manufactured on or after January 1, 2014, shall meet the applicable performance values in Table W-2.

*Table W-2
Standards for Large Battery Charger Systems*

| Performance Parameter | | Standard |
|--|--|-------------------------------|
| Charge Return Factor (CRF) | 100 percent, 80 percent Depth of discharge | Shall be ≤ 1.10 |
| | 40 percent Depth of discharge | Shall be ≤ 1.15 |
| Power Conversion Efficiency | | Shall be ≥ 89 percent |
| Power Factor | | Shall be ≥ 0.90 |
| Maintenance Mode Power (E_b = battery capacity of tested battery) | | Shall be ≤ $10 + 0.0012E_b W$ |
| No Battery Mode Power | | Shall be ≤ 10 W |

(2) **Energy Efficiency Standards for Small Battery Charger Systems.** Except as provided in sections 1605.3(w)(3), 1605.3(w)(4), and 1605.3(w)(5) of this Article, the following small battery charger systems shall meet the applicable performance values in Table W-3:

- (A) consumer products that are manufactured on or after February 1, 2013, and before June 13, 2018; and
- (B) those that are not consumer products and are manufactured on or after January 1, 2017.

EXCEPTION to Section 1605.3(w)(2): An à la carte charger that is :

- a. provided separately from and subsequent to the sale of small battery charger system manufactured before the effective date of the applicable standard in Section 1605.3(w)(2);
- b. necessary as a replacement for, or as a replacement component of, such small battery charger system;
- c. is provided by a manufacturer directly to a consumer or to a service or repair facility; and
- d. is manufactured no more than five years after the effective date in Section 1605.3(w)(2) applicable to the particular small battery charger system for which the à la carte charger is intended as a replacement or replacement component, shall not be required to meet the applicable standard in Section 1605.3(w)(2) and Table W-3 of this Article.

*Table W-3
Standards for Small Battery Charger Systems*

| Performance Parameter | Standard |
|---|--|
| Maximum 24 hour charge and maintenance energy (Wh) (E_b = capacity of all batteries in ports and N = number of charger ports) | For E_b of 2.5 Wh or less: $16 \times N$ |
| | For E_b greater than 2.5 Wh and less than or equal to 100 Wh: $12 \times N + 1.6E_b$ |
| | For E_b greater than 100 Wh and less than or equal to 1000 Wh: $22 \times N + 1.5E_b$ |
| | For E_b greater than 1000 Wh: $36.4 \times N + 1.486E_b$ |
| Maintenance Mode Power and No Battery Mode Power (W) (E_b = capacity of all batteries in ports and N = number of charger ports) | The sum of maintenance mode power and no battery mode power must be less than or equal to: $1 \times N + 0.0021 \times E_b$ Watts |

(3) Inductive Charger Systems. Inductive charger systems manufactured on or after February 1, 2013 and before June 13, 2018 and inductive charger systems that are not federally regulated battery chargers and manufactured on or after February 1, 2013, shall meet either the applicable performance standards in Table W-3 or shall use less than 1 watt in maintenance mode, less than 1 watt in no battery mode, and an average of 1 watt or less over the duration of the charge and maintenance mode test.

(4) Battery Backup and Non-Federally Regulated Uninterruptible Power Supplies. Battery backup and non-federally regulated uninterruptible power supplies that are manufactured on or after:

(A) February 1, 2013, for consumer products; and

(B) January 1, 2017, for products that are not consumer products shall consume no more than $0.8 + 0.0021 \times E_b$ watts in maintenance mode where E_b is the battery capacity in watt-hours.

(5) Standards for Federally Regulated Battery Chargers Manufactured on or After June 13, 2018. See section 1605.1(w) of this Article for standards for federally regulated battery chargers manufactured on or after June 13, 2018.

(x) Landscape irrigation equipment.

(1) Spray Sprinkler Bodies.

(A) A spray sprinkler body manufactured on or after October 1, 2020, shall meet all of the following requirements:

1. Maximum flow rate at any tested pressure level. The percent difference between the initial calibration flow rate, as determined by the test method in section 1604(x)(1)(A), and the maximum flow rate at any tested pressure level, averaged for the selected samples at the test pressure levels where the maximum flow rate occurred, shall not exceed ± 12.0 percent.

The average of the selected samples shall be calculated per the following equation:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

Where \bar{x} is the average of the selected samples; n is the number of samples; and x_i is the percent difference between the initial calibration flow rate, and the maximum flow rate at any tested pressure level of the i^{th} sample.

Percent difference of a sample = $100 \times (Q_{\text{max}} - Q_{\text{initial}}) / Q_{\text{initial}}$

Where Q_{max} is the measured maximum flow rate at any tested pressure level and Q_{initial} is the measured calibration flow rate.

- Average flow rate across all tested pressures. The percent difference between the initial calibration flow rate, as determined by the test method in section 1604(x)(1)(A), and the flow rate at each tested pressure level, averaged across all pressure levels and all selected samples, shall not exceed ± 10.0 percent.

The average of the selected samples shall be calculated per the following equation:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

Where \bar{x} is the average of the selected samples; n is the number of samples; and x_i is the percent difference between the initial calibration flow rate and the flow rate at each tested pressure level, averaged across all pressure levels of the i^{th} sample.

Percent difference of a sample = $100 \times (Q_{\text{average}} - Q_{\text{initial}}) / Q_{\text{initial}}$

Where Q_{average} is the measured flow rate at each tested pressure level, averaged across all pressure levels and Q_{initial} is the measured flow rate at the initial calibration point of a sample.

Minimum outlet pressure. The average outlet pressure at the initial calibration point, as determined by the test method in section 1604(x)(1)(A), of the selected samples shall not be less than two-thirds of the regulation pressure.

The average of the selected samples shall be calculated per the following equation:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

Where \bar{x} is the average of the samples; n is the number of samples; and x_i is the measured minimum outlet pressure at the initial calibration point for the i^{th} sample.

The following documents are incorporated by reference in Section 1605.3.

| <i>Number</i> | <i>Title</i> |
|---|--------------|
| FEDERAL REQUIREMENTS | |
| UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA) | |